

1. A process for forming a hollow article, comprising;
providing a mixture of metal and ceramic powders, lubricants, and binders, that form
a feedstock;
using a disposable material, forming a first molded part that has an outer surface;
through powder injection molding of the feedstock, forming a second molded part
that is in contact with said outer surface;
disposing of the first molded part; and
heating the second molded part whereby sintering occurs and said hollow article is
formed.

2. The process of claim 1 wherein said disposable material is selected from the group
consisting of thermoplastic polymers, thermosetting polymers, thermoplastic polymers
mixed with wax, thermosetting polymers mixed with wax, thermoplastic polymers mixed with
gel, thermosetting polymers mixed with gel, thermoplastic polymers mixed with agar,
thermosetting polymers mixed with agar, thermoplastic polymers mixed with glycol, and
thermosetting polymers mixed with glycol.

3. The process of claim 1 wherein said disposable material is disposed of through
melting or vaporization or ash-free combustion.

4. The process of claim 1 wherein said disposable material is disposed of through
attack by a solvent.

5. The process of claim 1 wherein the step of sintering is performed in a vacuum furnace or in an atmospheric furnace.

6. A process for forming a hollow article, comprising;
providing a mixture of metal and ceramic powders, lubricants, and binders, that form

5 a feedstock;

providing tooling that is able to injection mold from a first barrel into a first mold and from a second barrel into a second mold;

using a disposable material injected from the first barrel into the first mold, forming a first molded part that has an outer surface;

through powder injection molding of the feedstock from the second barrel into the second mold, forming a second molded part that is in contact with said outer surface;

disposing of the first molded part; and

heating the second molded part whereby sintering occurs and said hollow article is formed.

15 7. The process of claim 6 wherein said disposable material is selected from the group consisting of thermoplastic polymers, thermosetting polymers, thermoplastic polymers mixed with wax, thermosetting polymers mixed with wax, thermoplastic polymers mixed with gel, thermosetting polymers mixed with gel, thermoplastic polymers mixed with agar, thermosetting polymers mixed with agar, thermoplastic polymers mixed with glycol, and
20 thermosetting polymers mixed with glycol.

8. The process of claim 6 wherein said disposable material is disposed of through melting or vaporization or ash-free combustion.

9. The process of claim 6 wherein said disposable material is disposed of through attack by a solvent.

5 10. The process of claim 6 wherein the step of sintering is performed in a vacuum furnace or in an atmospheric furnace.

11. A process for forming a hollow article, comprising;
providing a mixture of metal and ceramic powders, lubricants, and binders, that form a feedstock;

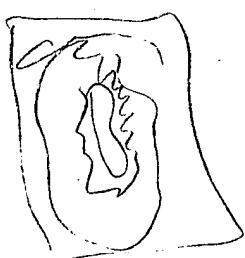
10 providing first and second tooling, one being able to injection mold from a first barrel into a first mold and one being able to injection mold from a second barrel into a second mold;

15 in the first tooling, using a disposable material injected from the first barrel into the first mold, forming a first molded part that has an outer surface;

transferring the first molded part to the second tooling;

in the second tooling, through powder injection molding of the feedstock from the second barrel into the second mold, forming a second molded part that is in contact with said outer surface;

disposing of the first molded part; and



heating the second molded part whereby sintering occurs and said hollow article is formed.

12. The process of claim 11 wherein said disposable material is selected from the group consisting of thermoplastic polymers, thermosetting polymers, thermoplastic polymers 5 mixed with wax, thermosetting polymers mixed with wax, thermoplastic polymers mixed with gel, thermosetting polymers mixed with gel, thermoplastic polymers mixed with agar, thermosetting polymers mixed with agar, thermoplastic polymers mixed with glycol, and thermosetting polymers mixed with glycol.

13. The process of claim 11 wherein said disposable material is disposed of through melting or vaporization or ash-free combustion.

14. The process of claim 11 wherein said disposable material is disposed of through attack by a solvent.

15. The process of claim 11 wherein the step of sintering is performed in a vacuum furnace or in an atmospheric furnace.

15 16. A process for forming a hollow casing with an internal moving part, comprising; providing a structure, said structure having a first outer surface; providing a mixture of metal and ceramic powders, lubricants, and binders, that form

a feedstock;

using a disposable material, forming a first molded part that contacts, and fully surrounds, said first outer surface, said first molded part having a second outer surface;

5 through powder injection molding of the feedstock, forming a second molded part that contacts said second outer surface;

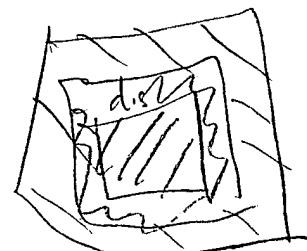
disposing of the first molded part; and

heating the second molded part whereby cermet formation through sintering occurs, said hollow casing is formed, and the structure is free to move inside said casing.

17. The process of claim 16 wherein said disposable material is selected from the group consisting of thermoplastic polymers, thermosetting polymers, thermoplastic polymers mixed with wax, thermosetting polymers mixed with wax, thermoplastic polymers mixed with gel, thermosetting polymers mixed with gel, thermoplastic polymers mixed with agar, thermosetting polymers mixed with agar, thermoplastic polymers mixed with glycol, and thermosetting polymers mixed with glycol..

15 18. The process of claim 16 wherein said disposable material is disposed of through melting or vaporization or ash-free combustion.

19. The process of claim 16 wherein said disposable material is disposed of through attack by a solvent.



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20. The process of claim 16 wherein the step of cermet formation through sintering is performed in a vacuum furnace or in an atmospheric furnace.
21. The process of claim 16 wherein the structure is magnetic.

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